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ABSTRACT

Almost every discussion of technical or scientific writing style mentions the passive voice as a stylistic choice to avoid. However, the passive voice does have legitimate uses in technical and scientific writing--the problem is to define the appropriate or effective uses and the inappropriate or ineffective ones. An examination of passive voice usage in six scientific and technical journal articles showed that more than 70% of the passive structures were truncated, or the subject deleted. Generally, the full passive was used when the subject of the passive was the theme of the discourse segment, or if the agent was so complex linguistically that its placement in the subject position could lead to a perceptually more difficult sentence. Truncated passives were often used in descriptions of experimental procedures, standard procedures, the state of knowledge, and natural processes. It would seem that the main fault of many prescriptions about the use of the passive voice is that they are overgeneralizations. (HOD)

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The Passive in Technical and Scientific Writing

Almost every discussion of technical or scientific style mentions the passive voice, usually as a stylistic evil to avoid. While I doubt that many of us would endorse such extreme prescriptions as "Always use the active voice,"[1] or "A writer will almost automatically improve his style when he shifts from passive to active constructions,"[2] we may be more ready to accept Freedman's position in "The Seven Sins of Technical Writing." His Sin 6 is "the Deadly Passive, or, better, deadening passive; it takes the life out of writing, making everything impersonal, eternal, remote and dead,"[3] but he adds that "frequently, of course, the passive is not a sin and not deadly, for there simply is no active agent and the material must be put impersonally."[4] From these two statements one would have to conclude that the legitimate use of the passive voice is restricted to situations where there is no "active agent." But is this conclusion correct? I think we can agree that the passive voice does have legitimate uses in technical and scientific writing and also that it is frequently misused. The problem is to define the appropriate or effective uses and the inappropriate or ineffective ones. In trying to solve this problem, I examined the use of the passive voice in six articles, three in Scientific American and three in more specialized journals.[5] On the basis of this very limited sample, I have selected five kinds of passive structures for further discussion here. Since I believe that the bias of the technical writing teacher is toward avoiding the passive voice, I have concentrated on the arguments that support the use of each of these five structures.

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The minimal distinction that must be drawn in discussing passive structures is between what is called the full passive and what is called the truncated passive.[6] The full passive, sentence 1, includes an agentive adjunct,[7] whereas the truncated passive, sentence 2, does not:

1. The ball was kicked by Bill.
2. The ball was kicked.

As a result, different arguments must be used to support or discourage the use of these two major kinds of passives. First, since the agent is specified in the full passive, the subject for an active voice equivalent is always available, so that sentence I can be replaced by sentence 3:

3. Bill kicked the ball.

On the other hand, if a truncated passive is to be replaced by an active clause, a subject must be supplied for the active clause, and there is considerable variation in how straightforward or desirable this is. Second, only the full passive is longer than the equivalent active, and this means that the argument that the passive "squanders words"[8] applies only to the full passive. The important similarity among all passives is that the recipient of the action, not the agent, is the subject. Whether or not this is a desirable feature depends on the discourse context of the passive structure under consideration, and on the nature of the statement the passive structure makes.

Although textbooks often discuss only the full passive, the full passive is rather rare in scientific writing, and in English prose generally. In four of the articles I examined, fewer than ten percent of the passives were full passives, and in the other two articles, only twenty percent and twenty-seven

percent of the passives were full. In other words, more than seventy percent of the passive structures in any of these articles were truncated, and this statistic is perhaps supported by Jespersen's claim that "over 70 percent of passive sentences found in English literature contain no mention of the active subject."[9] It may be interesting to note also that English is in fact unusual in having a full passive; most languages that have a passive voice have only the truncated passive.[10]

What, then, are the arguments for using the full passive instead of the active? First, as Jane Walpole and others have pointed out, the full passive may allow theme to be maintained in the discourse.[11] What this means, briefly, is that the subject of the sentence is usually interpreted as the theme, or what is being talked about.[12] If the agent is not the theme, then the full passive allows the writer to remove it from the subject position. In part, then, the choice between the full passive and the active is constrained by the discourse context of the particular clause. One fairly common use of the full passive is in the acknowledgement of the scientist responsible for a discovery, as in sentence 4:

> 4. Solions for "solution of ions" utilizing a reversible redox electrochemical system, were first proposed and studied by Elihu Root, III, at the U.S. Naval Ordnance Laboratory, now at Silver Spring, Md.[13]

Sentence 4 is the opening sentence in an article about solions; the active equivalent would have suggested that the article would be about Root. The use of the full passive to maintain theme is also shown in sentence 5:

5. The X-ray map of Cassiopeia A we have made, together with a spectrum of the remnant plotted from the same data, suggest that the X rays are radiated not by some central source but by hot gas produced by shock waves from the original explosion traveling through the interstellar medium.[14]

Clearly, X rays is the theme. Furthermore, in this case the subject of the equivalent active clause is so complex linguistically that the active would be clumsy at least:[15]

5a. ... suggest that not some central source but hot gas produced by shock waves from the original explosion traveling through the interstellar medium radiates the X rays.

Generally, then, we can argue that the full passive is a useful alternative to the active if the subject of the passive, and not the agent, is the theme of the discourse segment, or if the agent is so complex linguistically that its placement in subject position could lead to a perceptually more difficult sentence.

It is much more difficult to generalize about the truncated passive. Here I have limited my discussion to truncated passives used in the following four kinds of scientific discourse segments:

1. descriptions of experimental procedures
2. descriptions of standard procedures
3. descriptions of the state of knowledge
4. descriptions of natural processes.

These passives differ in the kind of subject their corresponding active clauses could have, if any.

The truncated passive used in descriptions of experimental procedures is almost synonymous in many people's minds with "the scientific style," and has probably received most attention in discussions of scientific style. What differentiates it most clearly from the other truncated passives I will discuss is the fact that the choice between it and an active clause is structurally unrestricted; it can easily be replaced by an active clause whose subject usually is I or we. For example, passage 6 can be replaced by passage 6a:

> 6. One sample was dissolved prior to thermal treatment. At 30 min. intervals, samples were withdrawn and dissolved in carrier solutions, and the temperature of the bath was increased by approx. $5^{o}C$.[16]
>
> 6a. We dissolved one sample prior to thermal treatment. At 30 min. intervals, we withdrew samples and dissolved them in carrier solutions, and we increased the temperature of the bath by approx. $5^{o}C$.

In practice, of course, I doubt that many writers exercise a conscious choice, for the truncated passive has become traditional. Tradition aside, however, the main argument that supports this use of the truncated passive is that it allows theme maintenance, for surely the discourse is not about the agent, but rather about the procedure. The counter-argument that the truncated passive obscures the identity of the agent is not valid in this case, it seems to me, for the agent is fully recoverable from the context. We assume that the agent

is the author(s) or the author's assistants, who allow him to perform the experiment by proxy. Another counterargument is that this use of the passive leads to monotonous prose. However, the active equivalent would probably be just as monotonous, since every sentence would have to repeat the agent in subject position. Also, at least in scientific articles, monotony is probably not a serious fault, for procedural descriptions are never read for entertainment, if they are read at all; the descriptions simply qualify the results.

A related but somewhat different use of the truncated passive is shown in passage 7:

> 7. To measure the number of gene copies the cellular DNA is broken into small pieces, the double strands are denatured (separated into single strands) by boiling, and a small amount of the radioactively labeled complementary DNA is added to the mixture under experimental conditions in which the complementary DNA can now hybridize with any DNA with which it has complementary nucleotide sequences.[17]

Whereas passage 6 describes a particular procedure, passage 7 describes a standard procedure; descriptions of particular procedures use the past tense, while descriptions of standard procedures use the present tense. Supplying a subject for an active equivalent is still not difficult; some choices are <u>one</u>, <u>a person</u>, or <u>we</u>. Thus, passage 7 could be replaced by passage 7a:

7a. To measure the number of gene copies, one breaks the cellular DNA into small pieces ...

However, since the active subject has to be general or indefinite, the active clauses are no more informative than the truncated passives, and the criticism that the passive obscures the identity of the agent clearly does not apply. In fact, this use of the truncated passive allows a writer to sidestep the issue of non-sexist language; as Mills and Walter have pointed out, "the active voice has in recent years become somewhat impractical because of distaste for the use of masculine pronouns ... in situations in which the referent may be either male or female."[18]

A truncated passive may also be used to describe the state of scientific knowledge. Consider, for example, passage 8:

8. The mechanics of isolating vibration are well understood, and the necessary physical properties of the isolators have also been determined.[19]

The two clauses present slightly different problems. It is difficult to supply an appropriate subject for an active equivalent of the first clause, for someone is probably too vague and narrow, the general we may be confused with the particular we if the paper has more than one author, and scientists or people is probably too broad. It seems to me that statements like those in passage 8 presuppose an abstract agent that represents our sense of a communal repository of knowledge, and the truncated passive allows us to avoid having to define this abstraction more concretely. In the second clause, however, in addition to the abstract agent, there are also, ultimately, specific agents who determined the physical properties of the isolators. Whether or not these

specific agents should be named depends in part on the purpose and audience of the discourse. Sentence 8 appears in Scientific American and the purpose is to provide fairly general information. If the same statement were presented for a more expert audience, documentation conventions would probably be used to identify the agents. This general category of truncated passives also differs from the previous ones in that the verbs are restricted to a rather small class.

Finally, the truncated passive is used to describe processes in which there is no direct human agency, as in sentence 9:

> 9. If the pulsar is embedded in a nebula, the electrons are presumably hurled into the nebula and spiral along its own magnetic lines of force, emitting radiation over an enormous range of wavelengths.[20]

Often it is very difficult to supply an accurate subject for an active clause equivalent in these cases, for the only legitimate choice may be something like "natural forces." In fact, in trying to supply such a subject, one could very easily distort scientific facts.

In conclusion, then, the main fault of many prescriptions about the use of the passive voice is that they are over-generalizations. For example: "The passive voice is weak and colorless. It is also wordier than the active voice, and tends to hedge. Nevertheless, it is often used in technical writing because it promotes impersonality and restraint ...."[21] While there is, of course, the passive voice, there isn't the passive clause, but rather a number of different kinds of passive clauses, so that a statement that applies to one kind does not necessarily apply to the other kinds. It is necessary, first of all, to distinguish between the full passive and the

truncated passive. The argument that the passive is wordy can only apply to the full passive, and the argument that the agent is obscured can only apply to some truncated passives. Within the category of truncated passive, further distinctions can be made on the basis of the kinds of subjects, if any, that could be supplied for active clause equivalents. As we have seen in this fragmentary examination, there are truncated passives for which it is impossible to supply active clause subjects, ones whose active clause subjects are abstract, ones whose active clause subjects are general and indefinite, and ones whose active clause subjects are directly recoverable from the discourse context. These different kinds of truncated passives are also used in different kinds of statements commonly found in scientific prose.

Notes

[1] Peter Burton Ross, Basic Technical Writing (New York: Thomas Y. Crowell, 1974), p. 210.

[2] Donald H. Menzel, Howard Mumford Jones, and Lyle G. Boyd, Writing a Technical Paper (New York: McGraw-Hill, 1961), p. 81.

[3] Morris Freedman, "The Seven Sins of Technical Writing," CCC, 9 (1958), 14.

[4] Freedman, 14.

[5] Theodore P. Yin, "The Control of Vibration and Noise," SA, 220 No. 1 (Jan. 1969), 98-106.

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Neville F. Alley and Steven C. Chatwin, "Late Pleistocene History and Geomorphology, Southern Vancouver Island, British Columbia," Canadian Journal of Earth Sciences, 16, No. 9 (Sept. 1979), 1645-1657.

[6] Robert Freidin, "The Analysis of Passives," Language, 51 No. 2 (1975), 384-405.

[7] John Lyons, Introduction to Theoretical Linguistics (Cambridge: Cambridge Univ. Press, 1968), p. 378.

[8] Kenneth W. Houp and Thomas E. Pearsall, Reporting Technical Information, 3rd ed. (Encino, Ca.: Glencoe, 1977), p. 138.

[9] Otto Jespersen, Essentials of English Grammar (London: Allen and Unwin, 1933), p. 121.

[10] Lyons, p. 378.

[11] Jane R. Walpole, "Why Must the Passive Be Damned?" CCC, 30 (Oct. 1979), 251-254.

[12] See John Lyons, Semantics, II (Cambridge: Cambridge Univ. Press, 1977), pp. 500-511; M. A. K. Halliday and Ruquaiya Hasan, Cohesion in English (London: Longman, 1976); Rodney D. Huddleston, The Sentence in Written English (Cambridge: Cambridge Univ. Press, 1971).

[13] Estes, 91.

[14] Charles and Culhane, 38.

[15] F. R. Palmer notes this use of the full passive on p. 87 in The English Verb (London: Longman, 1974).

[16] Bonte and Martin, 1481-82.

[17] Schimke, 63.

[18] Gordon H. Mills and John A. Walter, Technical Writing, 4th ed. (New York: Holt, 1978), p. 133.

[19] Yin, 101.

[20] Charles and Culhane, 40.

[21] Rufus P. Turner, Grammar Review for Technical Writers, rev. ed. (San Francisco: Rinehart, 1971), p. 53.